

**ABSTRACT OF THE DISCLOSURE**

A transparent electrode is provided on a glass substrate, and an amorphous silicon layer is provided on the transparent electrode. A nickel layer as a metal catalyst element is provided in or so as to contact with the surface of the amorphous silicon layer, followed by heat treatment to crystallize the amorphous silicon layer, thereby forming a p-type polycrystalline silicon layer. This polycrystalline silicon layer is crystallographically oriented and has high crystallinity. The polycrystalline silicon layer is used as a seed crystal to form a p-type polycrystalline silicon layer which is crystallographically oriented and, at the same time, has high crystallinity. Further, an i-type polycrystalline silicon layer and an n-type polycrystalline silicon layer are successively formed on the polycrystalline silicon layer. By virtue of the above construction, a crystalline silicon thin film semiconductor device, a crystalline silicon thin film photovoltaic device, and a process for producing a crystalline silicon thin film semiconductor device can be provided which can realize high crystallinity of polycrystalline silicon, crystallographic orientation, high characteristics, and excellent productivity.